CLAIMS

1. A sensor device comprising:

a support structure comprising a spine having a profile that is generally curved and a multiplicity of teeth extending from one side of said curved spine; and

a multiplicity of micromachined sensors supported by said support structure in positions whereby a curved aperture is provided.

2. The device as recited in claim 1, wherein said sensors comprise MUT cells.

3. The device as recited in claim 2, wherein said MUT cells are built on said spine, and said support structure further comprises a support member to which the ends of said teeth are attached.

4. The device as recited in claim 3, wherein the portion of said spine on which said MUT cells are built is made of silicon, as is portions of said teeth contiguous with said spine.

5. The device as recited in claim 2, wherein said MUT cells are built and distributed on the ends of said teeth, and said support structure further comprises a support member to which said spine is attached.

6. The device as recited in claim 5, wherein the portions of said teeth on which said MUT cells are built are made of silicon.

7. The device as recited in claim 1, wherein said curved aperture is convex.

8. The device as recited in claim 1, wherein said curved aperture is concave.

9. The device as recited in claim 1, wherein said teeth have non-periodic spacing.

10. A sensor device comprising:

a continuous substrate comprising a front face and a multiplicity of spaced plateaus projecting rearward;

a multiplicity of micromachined sensors fabricated on or in said substrate at its front face;

a multiplicity of backing bodies, each backing body being attached to a rear face of a respective plateau;

a support member having a front face, respective rear faces of said backing bodies being attached to said front face of said support member,

wherein said sensors do not lie in the same plane.

11. The device as recited in claim 10, wherein said sensors comprise MUT cells.

12. The device as recited in claim 10, wherein said front face of said support member has a profile that is generally convex.

13. The device as recited in claim 10, wherein said front face of said support member has a profile that is generally concave.

14. The device as recited in claim 10, further comprising a multiplicity of circuits built on a level below said sensors.

15. The device as recited in claim 14, wherein said circuits comprise CMOS electronics.

16. The device as recited in claim 10, wherein said substrate is made of silicon.

17. The device as recited in claim 11, wherein said MUT cells are cMUT cells.

18. The device as recited in claim 11, wherein said MUT cells are pMUT cells.

19. The device as recited in claim 10, wherein said backing bodies have non-periodic spacing.

20. A sensor device comprising:

a support member having a front face;

a continuous layer of backing material comprising a rear face attached to said front face of said support member;

a multiplicity of backing bodies connected to and extending forward of said continuous layer of backing material;

a multiplicity of sections of a substrate, each substrate section comprising a rear face attached to a front face of a respective backing body, adjacent ones of said substrate sections being separated from each other by a respective acoustically isolating gap or filled space; and

a multiplicity of groups of sensors distributed over the front faces of said substrate sections, each group being built on a front face of a respective one of said substrate sections,

wherein said sensors do not lie in the same plane.

21. The device as recited in claim 20, wherein said sensors comprise MUT cells.

22. The device as recited in claim 20, wherein said front face of said support member has a profile that is generally convex.

23. The device as recited in claim 20, wherein said front face of said support member has a profile that is generally concave.

24. The device as recited in claim 20, further comprising a multiplicity of circuits distributed in said substrate sections on a level below said sensors.

25. The device as recited in claim 24, wherein said circuits comprise CMOS electronics.

26. The device as recited in claim 20, wherein said substrate sections are made of silicon.

27. The device as recited in claim 21, wherein said MUT cells are cMUT cells.

28. The device as recited in claim 21, wherein said MUT cells are pMUT cells.

29. A method of manufacturing a sensor device, comprising the following steps:

(a) micromachining a multiplicity of sensors on a front face of a substrate;

(b) attaching a rear face of said substrate to a backing plate to form a lamination;

(c) dicing said lamination from the rear through said backing plate and further through a partial thickness of said substrate but not through a level where said sensors reside, forming a multiplicity of teeth separated by kerfs and leaving said sensors undisturbed, said teeth being connected at the roots of said kerfs by thin webs of said substrate;

(d) bending said thin webs of said substrate in the same direction, causing said diced lamination to bow one way or the other; and

(e) attaching rear faces of said teeth of said bent lamination to a front face of a support member having a profile that is concave or convex.

30. The method as recited in claim 29, wherein said sensors comprise MUT cells.

31. The method as recited in claim 29, further comprising the step of thinning said substrate by removing substrate material on a rear face of said substrate, said thinning step being performed after step (a) and before step (b).

32. The method as recited in claim 29, further comprising the steps of:

attaching said front face of said substrate to a temporary support structure, said dicing step being performed while said lamination is attached to said temporary support structure; and

detaching said temporary support structure from said lamination after said dicing step.

33. The method as recited in claim 29, wherein said dicing step comprises cutting said lamination with a laser beam.

34. The method as recited in claim 29, wherein said dicing step comprises cutting said lamination using a wafer dicing saw.

35. The method as recited in claim 29, further comprising the step of wet etching the roots of said kerfs with an etching process.

36. The method as recited in claim 29, further comprising the step of filling said kerfs with sound-absorbing material at least at the level of said substrate.

37. A method of manufacturing a sensor device, comprising the following steps:

(a) micromachining a multiplicity of sensors on a front face of a substrate in areas not to be diced;

(b) attaching a rear face of said substrate to a plate of backing material to form a lamination;

(c) dicing said lamination from the front through said substrate in areas where no sensors reside and further through a partial thickness of said backing plate, thereby forming a multiplicity of teeth separated by kerfs, said teeth being connected at the roots of said kerfs by thin webs of said backing material;

(d) bending said thin webs of said backing material in the same direction, causing said diced lamination to bow one way or the other; and

(e) attaching a rear face of said bowed backing material to a front face of a support member having a profile that is concave or convex.

38. The method as recited in claim 37, wherein said sensors comprise MUT cells.

39. The method as recited in claim 37, further comprising the step of thinning said substrate by removing substrate material on a rear face of said substrate, said thinning step being performed after step (a) and before step (b).

40. The method as recited in claim 37, further comprising the steps of:

attaching said rear face of said backing material to a temporary support structure, said dicing step being performed while said lamination is attached to said temporary support structure; and

detaching said temporary support structure from said lamination after said dicing step.

41. The method as recited in claim 37, wherein said kerfs have a non-periodic spacing.

42. The method as recited in claim 37, further comprising the step of filling said kerfs with sound-absorbing material at least at the level of said substrate.